NAVAL WAR COLLEGE
Newport, R.I.

Command and Control of Theater Missile Defense: Joint Doctrinal Imperative

by

William L. Spacy II

Major, US Air Force

A paper submitted to the Faculty of the Naval War College in the partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature

13 June 1997

Paper directed by
Captain George W. Jackson, U.S. Navy
Chairman, Joint Military Operations Department

REPORT DOCUMENTATION PAGE

1. Report Security Classification: UNCLASSIFIED	
2. Security Classification Authority:	
3. Declassification/Downgrading Schedule:	
4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.	
5. Name of Performing Organization: JOINT MILITARY OPERATIONS DEPARTMENT	
6. Office Symbol: C	**7. Address:** NAVAL WAR COLLEGE 686 CUSHING ROAD NEWPORT, RI 02841-1207
8. Title (Include Security Classification): Command and Control of Theater Missile Defense: Joint Doctrinal Imperative (UNCLASSIFIED)	
9. Personal Authors: WILLIAM L. SPACY, II, Major, USAF	
10.Type of Report: FINAL	**11. Date of Report:** 7 Feb 97
12.Page Count: 20	
13.Supplementary Notation: A paper submitted to the Faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.	
14. Ten key words that relate to your paper: JTMD, Theater Missile Defense, Theater Balllistic Missile (TBM), COMMAND, CONTROL	

15.Abstract: The theater ballistic missile (TBM) threat is serious and growing. To counter this threat, the United States intends to build an integrated joint theater missile defense (JTMD) with an active defense system capable of operating in a fully automated mode. Since doctrine, by definition, prescribes the method for employing combat forces, it is incumbent on the U.S. military to determine the best doctrine for employing this JTMD system. Current doctrine is inadequate in that it fails to provide the joint force commander (JFC) with the guidance necessary to organize the theater for JTMD. Future doctrine should, as a minimum, guide the JFC in making the organizational, informational and operational decisions necessary to deploy the JTMD system. In light of the continued rapid proliferation of TBMs, this doctrine must give the JFC the guidance necessary to make optimum use of JTMD assets. To ensure this optimum use, a JTMD system must include centralized command and control of active defense assets. Depending on the severity of the threat, the commander responsible for JTMD should be either the JFACC, AADC or a specifically designated JFMDC.

16.Distribution / Availability of Abstract: Unlimited	**Unclassified** X	**Same As Rpt**	**DTIC Users**
17.Abstract Security Classification: UNCLASSIFIED			
18.Name of Responsible Individual: CHAIRMAN, JOINT MILITARY OPERATIONS DEPARTMENT			
19.Telephone: 841-6461		**20.Office Symbol:** C	

ABSTRACT

The theater ballistic missile (TBM) threat is serious and growing. To counter this threat, the United States intends to build an integrated joint theater missile defense (JTMD) with an active defense system capable of operating in a fully automated mode. Since doctrine, by definition, prescribes the method for employing combat forces, it is incumbent on the U.S. military to determine the *best* doctrine for employing this JTMD system. Current doctrine is inadequate in that it fails to provide the joint force commander (JFC) with the guidance necessary to organize the theater for JTMD. Future doctrine should, as a minimum, guide the JFC in making the organizational, informational and operational decisions necessary to deploy the JTMD system. In light of the continued rapid proliferation of TBMs, this doctrine must give the JFC the guidance necessary to make *optimum* use of JTMD assets. To ensure this optimum use, a JTMD system must include *centralized command and control* of active defense assets. Depending on the severity of the threat, the commander responsible for JTMD should be either the JFACC, AADC or a specifically designated JFMDC.

TABLE OF CONTENTS

I. Introduction

The theater ballistic missile (TBM) threat is serious and growing.[1] As seen in the 1991 Gulf War, even relatively unsophisticated ballistic missiles can present serious problems for the joint force commander (JFC). While the Scuds launched by Iraq were not a serious threat to military forces, they were quite effective when used as terror weapons against civilian targets. In response to this threat, the multinational coalition allocated almost 2500 sorties to finding and destroying mobile Scud launchers.[2] The effectiveness of this effort was questionable, however, since U.S. intelligence agencies have been unable to confirm the destruction of any mobile Scuds.[3] While this intensive "Scud hunt" limited Iraqi efforts by forcing them to attack only at night or during adverse weather, missiles were still launched and had to be countered with the only system then available, the Patriot surface-to-air missile system.

While Patriot is credited with a 60 percent success rate, it proved to be less than optimal as a defensive system.[4] As a case in point, using it to destroy Scuds over Israel caused more damage and injuries than did letting the missiles strike.[5] The only positive effect this missile defense system had, was the admittedly important one of boosting the morale of the Israeli people. These shortfalls in the U.S. military's ability to defend against TBMs have spawned DOD-wide initiatives to develop a joint theater missile defense (JTMD) system.

Joint Vision 2010 describes a concept called "Full Dimensional Protection" which includes "an integrated, in-depth theater air and missile defense that will exploit Service-unique capabilities to detect, identify, locate, track, and deny enemy attacks on our joint

forces."[6] Missile defense programs underway to realize this vision include efforts aimed at improving each of the four pillars of JTMD:

- Attack Operations
- Active Defense
- Passive Defense
- Command, Control, Communications, Computers, and Intelligence (C4I)

This paper will focus on doctrinal changes necessary to make optimum use of an integrated *active defense* system capable of fully automated operation. Specifically it will focus on what decisions a combatant commander or JFC will have to make when deploying such a system into a theater of war.

II. Projected Theater Missile Defense Capabilities

Theater ballistic missiles and cruise missiles comprise the theater missile threat. Defense against each of these weapons presents its own set of technological challenges, but much of the doctrine proposed here for TBM defense is equally valid for cruise missile defense. A detailed look at doctrine for cruise missile defense, however, is beyond the scope of this paper.

Active defense against theater ballistic missiles is comprised of three parts:

- Boost Phase Intercept (BPI)
- Mid-course intercept or "upper tier defense"
- Terminal or "lower tier" defense

Current initiatives should lead to an integrated, layered defensive system where space or airborne sensors are able to pass missile launch and targeting information directly to the three layers of defensive systems deployed to engage the missile.

The space-based sensor program currently under development is the space-based infrared (SBIR) detection system for missile launch warning. As outlined by Gen Ronald R. Fogleman, the Air Force Chief of Staff, this system will report TBM launches directly to theater forces and provide mid-course tracking and discrimination data for terminal defenses. This cueing by the SBIR system will serve to extend an interceptor's effective range and increase its effectiveness.[7] Other JTMD systems currently under development will also make use of the SBIR system.

The core programs for active defense are being managed by the Ballistic Missile Defense Organization. These core programs are currently in the acquisition process and include:

- Theater high altitude area defense (THAAD) system
- Navy Area Defense system
- Patriot PAC-3[8]

The Navy Theater Wide system was recently added to the core program, but is still in the concept definition phase of development.[9] These programs address the mid-course engagement (THAAD, Navy Theater Wide) and terminal engagement phases (Navy Area Defense, Patriot) of TBM defense. For BPI the Air Force is pursuing a loitering airborne laser platform with planned deployment in 2008.[10]

Developing a C4I system to effectively integrate these systems is the goal of future DOD programs. According to Gen Fogleman, the planned C4I system will "provide war-fighting theater commanders a seamless, flexible command and control system."[11] With the Air Force Chief of Staff behind this vision, there seems little doubt of the ultimate direction of JTMD efforts. A system capable of automatically detecting, tracking and engaging a TBM in all phases of flight, forms the basis for the rest of this paper.

III. Current Doctrine for Joint Theater Missile Defense

According to current doctrine, "the geographic combatant commander establishes theater guidance and objectives for JTMD, and assigns and/or apportions forces and resources." This doctrine describes the role of the JFC and his staff as that of establishing guidance and objectives, information fusion, and JTMD planning and coordination.[12] Where current doctrine most notably fails, however, is in providing a concept for integrating all phases of active defense. As highlighted in a defense science board report on theater missile defense:

> "JCS Pub 3-01.5 outlines what ought to be accomplished for effective TMD. However, it does not institutionalize or provide a basis for developing the means to execute TMD nor for integrating the various systems into a joint capability for successful missile defense."[13]

As an example, under "Responsibilities and Command Relationships", JCS Pub 3-01.5 delegates authority to integrate air defense forces and operations to the area air defense commander (AADC).[14] However for active defense against TBMs, *the AADC* is really only

responsible for *establishing weapon control procedures*, and developing and executing plans for *dissemination of launch warning and cueing information.*[15]

JCS Pub 3-01.5 next gives the *component commanders* responsibility to plan JTMD operations "as directed by the JFC . . . in accordance with weapon control procedures and measures established by the AADC." It also says that "Close coordination among component commanders, the JFC and the AADC is necessary to . . . ensure a synergistic effect."[16] This guidance seems to imply that "close coordination" between the component commanders and the AADC, overseen by the JFC, will provide an effective defense against a threat that reaches its target only minutes after detection.

This type of doctrinal guidance continues in the active defense section of Chapter III which is titled "Planning and Operations." For example, current doctrine calls for TBMs to be "engaged by all means available throughout their entire flight profile," but treats each phase of engagement in isolation from the others.[17] In the case of terminal defense the doctrine is fairly straight forward, stating ". . . active defense operations should be integrated within the theater/JOA air defense system."[18] Doctrine for "ascent and mid-course phases" is confusing, however, as it specifies that: "units begin processing for engagement and selecting fire units or weapon systems to perform the engagement based on firing doctrine, ROE, weapons and equipment status, and probability of kill."[19] This guidance is not only very specific–dictating what to consider when deciding which weapon to fire–it is at the same time it is too vague, leaving this decision making process to the ill-defined "units". For the boost phase, doctrine again seems to stipulate an integrated approach, saying that BPI

requires the integral linking of detection, acquisition and attack systems.[20] At no point does JCS Pub 3-01.5 suggest a doctrine that truly integrates all phases of active defense.

Current doctrine next proceeds to give operational control (OPCON), and presumably tactical control (TACON), of active defense assets to the component commanders.[21] This seems to clarify who the previously mentioned "units" might be in the case of "ascent and mid-course phases", but adds confusion as to who has TACON of BPI and terminal defense assets, since the AADC theoretically integrates these into the theater air defense system. The AADC seems to have TACON of terminal defense assets, and possibly BPI assets, but this fact is implied and not specifically stated.

In summary, current TMD doctrine seems to imply, on the one hand, that terminal phase and BPI engagements are *integrated* into the theater air defense system, and on the other, that the AADC serves only to *coordinate* efforts for mid-course engagements. This doctrine may be adequate for now, since the United States has only fielded terminal defense systems. In the future, however, more capable systems will become available and this doctrine will have to change in order to fully exploit their capabilities.

IV. Operational Considerations not Addressed in Current Doctrine

Current doctrine ignores the oldest tenet of aerospace power–centralized control and decentralized execution. As stated in *Basic Aerospace Doctrine*,

> "Without centralized control commanders cannot exploit the speed and flexibility of aerospace platforms to concentrate forces–whether in attack or defense–from diverse locations on decisive points . . . ."[22]

This tenet applies nowhere better than to JTMD, where the challenge is to effectively use geographically dispersed, long range weapons to engage incoming TBMs. This section explores the specifics of what doctrine should address in order to make optimal use of the integrated active defense system described above.

An integrated active defense system will make the technical aspects of TMD defense much simpler. The challenge will be to effectively organize the theater to make optimum use of this system. When doing this, the JFC will generally need to make three kinds of decisions: organizational, informational and operational. Each type of decision will be dependent on both the TBM threat and the JTMD assets available to the JFC.

Organizational Decisions

When addressing active defense, the first decisions the JFC must make are organizational. The most important of these is determining the best command structure for implementing JTMD. In addition, once the active defense system is deployed, the JFC must make the operational decision of whether or not to use the fully automated mode. If the JFC chooses less than full automation, he must designate who is responsible for deciding which assets to use against which targets. As Gen John J. Sheehan, USACOM commander, said in a recent interview:

> "But let's suppose I had a battlefield sensor, . . . that could locate and laser a TEL. The TEL is on the move. If I could downlink that information to an ATACMS battery, what clearance do I need to fire it? Who makes the decision?"[23]

While Gen Sheehan's example deals with an attack operation, it applies equally well to active defense systems capable of engaging targets throughout the depth of a theater.

When addressing this question of command relationships, the JFC must first decide what to do about TACON for JTMD assets. Whether to leave TACON with the component commanders or give it to the joint force air component commander (JFACC), AADC, or even a joint force missile defense commander (JFMDC), will depend on the theater threat and the assets available. In the optimal case, the JFC will have an array of defensive weapons capable of operating as a single integrated system. This system will be comprised of weapon systems that operate at extremely long ranges and have overlapping engagement envelopes. These long ranges coupled with the short times available to successfully engage TBMs, will require real-time decisions about which unit/weapon system will engage a target. Similar to arguments Col Barnett made for engaging low signature cruise missiles in his book *Future War*, JTMD requires a centralized command and control (C2) system to be truly effective.[24] This is also in keeping with the previously mentioned tenet of centralized control and decentralized execution, hence *the JFC will usually want to make a single commander responsible for JTMD assets.*

The exercise ROVING SANDS 96 highlighted the need for clear command relationships, including centralized control, in future doctrine. For this exercise the AADC was operating out of an AEGIS cruiser and directed the re-deployment of a Patriot battery to cover a sector which the AEGIS could no longer cover. The command relationships set up for the exercise placed the Patriot battery under TACON of the sector air defense coordinator

(SADC), a functional alignment. Since the direction to move had come from the AADC and not the SADC, the Patriot commander remained where he was. This failure to re-deploy left a sector undefended and open to subsequent attack.[25]

The Patriot commander's understanding of the situation, and subsequent actions, were in accordance with current doctrine. As mentioned above, this doctrine is vague as to whom should have TACON of active defense systems. It can easily be interpreted to stipulate that the component commanders have TACON, and the JFACC or AADC act only as a coordinating agency. It is the *responsibility of the JFC* to clarify these command relationships, but having clear doctrinal guidance to lay a foundation of expectations can only help when questions arise. Current doctrine, at best, puts several echelons of command in the decision loop and, at worst, leaves inadvertent gaps in theater defenses.

Another risk entailed with this doctrine is that either more than one unit will engage the target, as happened during Operation DESERT STORM,[26] or that the missile gets through because several units hesitate to fire, each thinking that one of the others is engaging the target. This argument will be particularly true for future mid-course intercept systems, due to the extremely long ranges inherent in this phase of defense, but will also be true for the other phases of active defense. A command structure with a single JTMD commander will take advantage of the integrated nature of the active defense system, and ensure unity of command rather than settling for unity of effort.

The next organizational decision the JFC must make is *who* should have responsibility for JTMD. Considerations will include whether the commander should be land-based or afloat or should transition from one to the other. The JFC's decision will depend on the geography of the theater and the sequence in which JTMD assets become available. In any case, *the person responsible for JTMD must have a comprehensive picture of the air battle*. Even with a fully automated active defense system, the close coordination required among the four pillars of JTMD, as well as between JTMD and other air operations, requires the focused effort of a single commander with direct access to all of the necessary information. If the JFC elects not to use the active defense system in the fully automated mode, then the argument for a single commander with theater-wide TACON of JTMD assets is even stronger, since human beings must then decide which weapons to fire.

Informational Decisions

The next type of decision the JFC must address is informational. As mentioned above, sensors will automatically transmit all information required for engaging TBMs to the JFMDC and thence to the appropriate active defense systems. The JFC must ensure that component commanders are kept informed about the disposition of their TMD assets so that service provided logistic support remains synchronized. Additionally, information regarding launch operations must be disseminated to those who may be in the vicinity of the launch area. This last point becomes particularly important if the active defense system is used in a fully automated mode.

Another informational decision required of the JFC might include how to deal with neighboring countries which are not active participants in the war, but may be attacked

because they are friendly to the United States. The JFC must make provisions for passing information to these countries for reasons pertaining to both passive and active defense operations. While the informational needs for passive defense are well known, a country with a sophisticated TBM defense of its own could be greatly aided by our detection and tracking systems. The fielding of mid-course intercept weapons capable of extremely long range intercepts may also present new challenges. Due to their long burn time and bright exhaust plume, these weapons may themselves appear to be TBMs to a third country's defensive system. History has shown that an enemy may indeed attack neighboring countries friendly to the United States, so the JFC must make these informational decisions early in the establishment of JTMD.

Operational Decisions

Once the JFC decides on centralized command and control of JTMD, an important operational decision is whether or not to employ the JTMD system in a fully automated mode. The arguments *against* using a fully automated mode for JTMD are fairly strong. Having a person determining which assets should engage which targets provides more flexibility than even the best computer algorithm. While sophisticated algorithms can make many decisions, the people writing these algorithms cannot foresee every eventuality and include it in the program. A major consideration is how well a fully automated system can deal with false alarms. A human with immediate access to all available information, can use multiple systems to verify launch warnings, and use judgment to decide which information to believe. An automated system, on the other hand, will be limited to a pre-set method for filtering out contradictory data.

In contrast, the argument *in favor* of using the system in a fully automated mode is strongest when facing the possibility of a barrage type attack. If large numbers of TBMs are being launched, it is quite possible that the only effective defense will be to let the system do its best. Even in this case a single commander will be able to quickly make the decision to employ the fully automated mode, and to disengage it when it is no longer necessary. As a minimum, the JFC should establish the rules of engagement for using this mode of operation.

Another operational decision is how to integrate JTMD into the theater airspace control plans. All phases of active defense will entail extremely high speed weapons transiting airspace which is simultaneously being used by a diverse array of aircraft. This task also calls for the expertise and perspective of a centralized commander of air operations. This person would be responsible for airspace segregation, airspace control, and engagement tasking which could be critical to avoiding *unnecessary* disruption of ongoing operations in the event of TBM attacks. If JTMD assets are parceled out to the component commanders, the short time available makes the passing of warning information to *only* those who need it a difficult task. Centralized planning and control of JTMD would greatly simplify this task and help to minimize the disruption of other operations.

A final operational decision will probably be how to deploy the JTMD assets into the theater. It makes sense to plan for phased deployment of JTMD, since the various systems will probably arrive in theater at different times. The option of using BPI, mid-course intercept and terminal defense systems independently of each other will give the JFC more flexibility in deploying and allocating assets, but puts a premium on the quality of the threat assessment. Since the ground based assets use large numbers of scarce airlift resources, the

JFC must determine which assets will have priority for deployment. Protection of these assets is also a consideration, for example THAAD systems will not be able to defend themselves from aircraft or cruise missiles and without air superiority it would not be prudent to deploy relatively defenseless high-value assets like airborne laser aircraft. As JTMD assets arrive in theater and become operational, the JFC must ensure that they are quickly incorporated into a single integrated system under centralized control.

V. Conclusion

The United States intends to build an integrated theater ballistic missile defense system capable of fully automated operation. Since doctrine, by definition, prescribes the method for employing combat forces, it is incumbent on the U.S. military to determine the *best* doctrine for employing this JTMD system. Current doctrine is inadequate in that it fails to provide the JFC with the guidance necessary to organize the theater for JTMD. Future doctrine should, as a minimum, guide the JFC in making the organizational, informational and operational decisions necessary to employ a JTMD system. In light of the continued rapid proliferation of TBMs, this doctrine must give the JFC the guidance necessary to make *optimum* use of JTMD assets. As argued above, a JTMD system must include *centralized command and control* of active defense assets to ensure this optimum use. Depending on the severity of the threat, the JFC should delegate responsiblity for JTMD to either the JFACC, the AADC, or a specifically designated JFMDC.

NOTES

1. David E. Snodgrass, "Attacking the Theater Mobile Ballistic Missile Threat," Unpublished Research Paper, Air University, Maxwell AFB, AL: 1993, 11-18.

2. Stewart M. Powell, "Scud War, Round Three," Air Force Magazine, October 1992, 33.

3. "Circles of Fear", The Economist, 4-10 January 1997, 33.

4. "Circles of Fear", 33.

5. David Hughes, "Success of Patriot System Shapes Debate on Future Antimissile Weapons," Aviation Week and Space Technology, 22 April 1991, 90.

6. U.S. Joint Chiefs of Staff, Joint Vision 2010, (5126 Joint Staff, Pentagon, Washington DC), 23.

7. "Air Force embellishes BM/C4I for TMD", BMD Monitor, 30 June 1995.

8. Ballistic Missile Defense Organization, Fact Sheet 96-001: U.S. Ballistic Missile Defense Program Focus, March 96, 2.

9. Jeff Erlich and Robert Holzer, "Navy's Gain Could Become Army's Loss In TMD Race ," Defense News, 16 22 December 1996, 3.

10. Phillips Laboratory Office of Public Affairs, YAL-1A Attack Laser Fact Sheet, (Kirtland AFB, NM: 12 November 1996).

11. "Air Force embellishes BM/C4I for TMD", BMD Monitor, 30 June 1995.

12. Joint Doctrine Division (J-7), JP 3-01.5: Doctrine for Joint Theater Missile Defense, (7000 Joint Staff, Pentagon: 22 February 1996), II-1.

13. Office of the Secretary of Defense, Report of the Defense Science Board/Defense Policy Board Task Force on Theater Missile Defense, (Washington: January 1996), 29.

14. JP 3-01.5, II-5.

15. JP 3-01.5, II-5.

16. JP 3-01.5, II-7.

17. JP 3-01.5, III-7.

18. JP 3-01.5, III-8.

19. JP 3-01.5, III-8.

20. JP 3-01.5, III-7, 8.

21. JP 3-01.5, III-9.

22. Department of the Air Force, Air Force Manual 1-1, Basic Aerospace Doctrine, v. II (Washington: U.S. Govt. Print. Off., March 1992), 113.

23. "USACOM Chief Crafts Anti Missile Plan For All Seasons", Defense Week, 11 November 1996.

24. Jeffrey R. Barnett, Future War, (Maxwell AFB, AL: Air University Press, 1996), 32-34.

25. U.S. Army Test and Experimentation Command, Joint Project Optic Cobra (JPOC 1996-20) Final Report (Draft), (Washington: October 1996), pp. 3-11 - 3-13.

26. H. Norman Schwarzkopf, It Doesn't Take a Hero, (New York: Bantam 1992), 419.

Bibliography

"Air Force embellishes BM/C4I for TMD," BMD Monitor, 30 June 1995.

"Army, Air Force Still At Odds Over Missile Defense Roles," Defense Week, 3 September 1996.

Barnett, Jeffrey R. Future War. Maxwell AFB AL: Air University Press, 1996.

Bird, Julie. "Gulf Airstrikes Left Scuds Intact; Study Cites Airwar Flaws, Need for Joint Forces Air Chief," Defense News, 17-23 May 1993.

"Circles of Fear" The Economist, January 4-10, 1997, 33-34.

Department of the Air Force. Air Force Manual 1-1, Basic Aerospace Doctrine, v. II. Washington: U.S. Govt. Print. Off., March 1992.

Hughes, David. "Success of Patriot System Shapes Debate on Future Antimissile Weapons," Aviation Week and Space Technology, 22 April 1991.

Joint Doctrine Division (J-7). JP 3-01.5, Doctrine for Joint Theater Missile Defense. 7000 Joint Staff, Pentagon: 22 February 1996.

Office of the Secretary of Defense. Report of the Defense Science Board/Defense Policy Board Task Force on Theater Missile Defense. Washington: January 1996.

Phillips Laboratory Office of Public Affairs. YAL-1A Attack Laser Fact Sheet. Kirtland AFB, NM, November 12, 1996.

Powell, Stewart M. "Scud War, Round Three." Air Force Magazine, October 1992, 34.

Snodgrass, David E. "Attacking the Theater Mobile Ballistic Missile Threat." Unpublished Research Paper. Air University, Maxwell AFB AL: 1993.

Schwarzkopf, H. Norman. It Doesn't Take a Hero. New York: Bantam, 1992.

"USACOM Chief Crafts Anti-Missile Plan For All Seasons." Defense Week. 11 November 1996.

U.S. Army Test and Experimentation Command. Joint Project Optic Cobra (JPOC 1996-20) Final Report (Draft). Washington: October 1996.

U.S. Joint Chiefs of Staff. Joint Vision 2010. 5126 Joint Staff, Pentagon, Washington DC.

Zuberbuhler, R. Et al. Theater Battle Management Interoperability Analysis. MEI Technology Corporation, Rome NY, June 1996.